

### Trend Study 13B-1-05

Study site name: Lower Westwater Dolores .

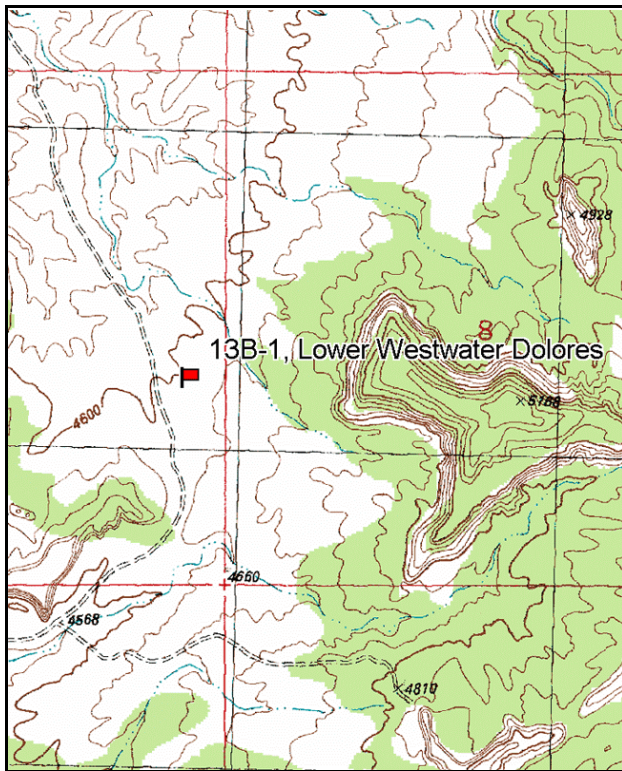
Vegetation type: Basin big sagebrush .

Compass bearing: frequency baseline 165 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

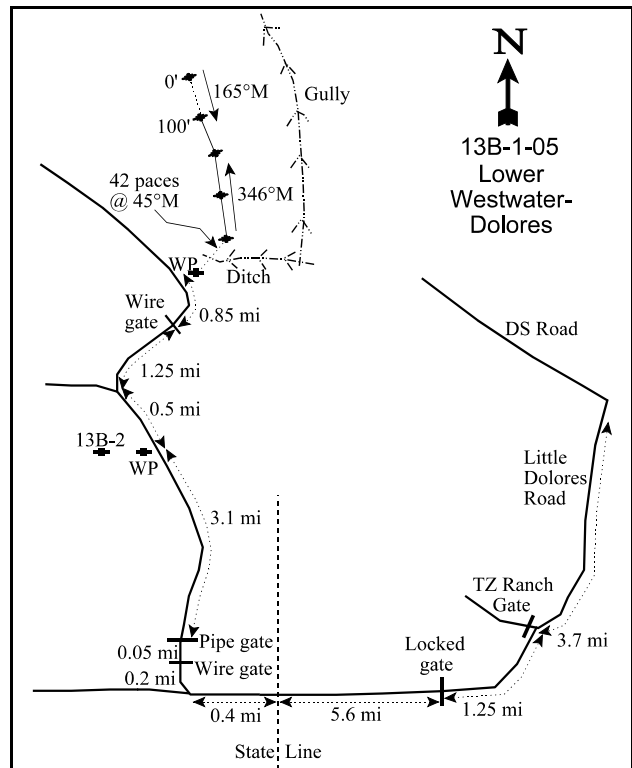
#### LOCATION DESCRIPTION

From the intersection of the DS Road and Little Dolores Road west of Glade Park, Colorado, go down Little Dolores Road 3.7 miles to the TZ Ranch gate. Turn left and go 1.25 miles along the fence to another gate (permission and key necessary to get through gates). Continue 5.6 miles to the state line. Go another 0.4 miles to a cabin. Turn right along the edge of a field and go 0.2 miles to a wire gate and another .05 to a pipe gate. Go 3.1 miles to transect 13B-2. Continue 0.5 miles to a fork near a sheep corral. Keep right. Continue 1.25 miles to a wire gate, then another 0.85 miles to the witness stake, a 2 ½ foot tall fencepost off the right side of the road on top of the road cut. From the witness post, walk 42 paces at 45°M to the 400-foot baseline stake.



Map Name: Westwater 4SE

Township 20S, Range 26E, Section 7



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4327184 N, 666822 E

## DISCUSSION

### Lower Westwater-Dolores - Trend Study No. 13B-1

The Lower Westwater-Dolores study site is in an open valley initially dominated by basin big sagebrush and surrounded by slick rock cliffs and domes of sandstone. It is on a 10% west-facing slope, nearly 2 miles from the Colorado River at an elevation of 4,600 feet. The land is administered by the BLM out of the Grand Junction office in Colorado. The allotment is grazed by cattle and horses from November through May. This is a poor time to graze the area with respect to wildlife and it causes the eventual loss of the cool season herbaceous species. This will slowly predispose the area to the eventual conversion of the understory to winter annuals, primarily cheatgrass. Other than newly germinated cheatgrass, which is dependent upon mostly autumn precipitation levels for germination, there is little forage for both cattle and wildlife. The pellet group data estimated 79 deer days use/acre (195 ddu/ha), 12 elk days use/acre (30 edu/ha), and 27 cow days use/acre (67 cdu/ha) in 2000. In 2005, 29 deer, 1 elk, and 26 cow days use/acre (73 ddu/ha, 2 edu/ha, and 65 cdu/ha) were estimated. All droppings were estimated to be from the previous winter.

The soil is protected fairly well by the combination of vegetation and litter. Litter was moderately abundant in 1995, mostly from annuals, with a cover value estimated at 51%. With drought, litter decreased to 35% in 2000 and 31% in 2005. The soil is moderately deep with an average effective rooting depth of 19 inches. There is a compacted layer of fine sands and clay at about 6 inches, which becomes less compacted beyond 14 inches. Almost without exception, the shrub interspaces had shallower effective rooting depths than near the base of the shrubs. The soil is classified as a sandy loam and is moderately alkaline (8.2 pH). Phosphorus could be limiting with a value of only 3.9 ppm. Values less than 6 ppm may affect normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). No rock or pavement was encountered on the surface or in the profile. Erosion has not been a problem. However, pedestaling around the sagebrush is about 5 to 7 inches. The erosion condition class determined soil movement as stable in 2005.

The key browse species on this site is basin big sagebrush with some apparent Wyoming big sagebrush hybrids. This stand exhibits a distinctly clumped dispersion pattern with a dense understory of annual species. Some sagebrush display a clubbed appearance and show more character traits of Wyoming sagebrush. Others, not clubbed and not as hedged by wildlife, have more traits of basin big sagebrush. In 1995, only 1% of the population were young and 66% were mature. In 2000, just below 2% of the population were young and 45% mature. In 2005, there were no young individuals, 33% of the population was mature. Decadence increased from 12% in 1986 to 32% in 1995, 53% in 2000, and 67% in 2005. No seedlings, or very few, were sampled any year due to intense competition with the high number of winter annual grasses and forbs. In 1995 and 2000, 26% of the population was classified as dying and the number of dead plants in the population (1,920 plants/acre) far outnumbered the living. In 2005, the percent of the populations dying had increased to 67%. This increase in the percent dying was related to a drastic decrease in density from 1,240 plants/acre in 2000 to only 60 plants/acre in 2005. Cover from the basin big sagebrush contributed only 2% cover in 1995 and in 2000, and decreased to about 0.2% by 2005. This decrease in sagebrush numbers and the increase in decadent and dying plant percentages was caused by the combination of drought and competition with annual species.

Other browse species include broom snakeweed and spiny hopsage which were found in very low densities. Green ephedra density was low and utilization was high in 1986. It appeared to be dying off. None were sampled in 1995, 2000, or 2005. On the opposing slope, there is a vigorous stand of sand sagebrush, which has appeared to survive the drought better than basin big sagebrush. Also observed were a few decadent spiny hopsage and a few scattered juniper.

In 1995, annual species (both grasses and forbs) contributed 83% of the herbaceous vegetation cover. Cheatgrass alone provided 67% of the herbaceous vegetation cover and 86% of the total grass cover. This changed little with the 2000 reading. In 2005, the annual species contributed 95% of the total herbaceous

cover, cheatgrass made up 56% of the herbaceous cover and 81% of the total grass cover. There were very few perennial herbaceous species present which contributed a small percent of the herbaceous cover (16% in both 1995 and 2000, and 5% in 2005). The most abundant perennial grass, galleta (a warm season grass) has significantly declined in nested frequency since 1986. Annual forbs have been very abundant. Annual forb cover was greater than 12% in 2005.

#### 1986 APPARENT TREND ASSESSMENT

The soil trend is stable, although there are signs of some soil movement from litter and/or cryptogam cover is disturbance. The vegetation condition and trend is somewhat puzzling. There appears to have been a sagebrush die-off in recent years. This was not because of grazing pressure which has only been light to moderate use in the past. It was probably more of a response to the excessively wet years of 1983-85. Basin big sagebrush naturally experiences a fairly rapid turnover in generations and it seems to be occurring on this site at the present time. There appears to be a sufficient proportion of young plants to maintain shrub density at an acceptable level. Trend therefore appears to be stable.

#### 1995 TREND ASSESSMENT

Due to abundant protective ground cover, decrease in percent bare ground, and no apparent erosion problems, soil trend is considered stable. Unfortunately, most of the soil cover comes from annual species and litter. Although the abundant cover of annuals helps to protect the soil, it is very detrimental to the health of the community to have such a high amount of fine fuels present. It is only a matter of time before a fire will completely destroy the sagebrush population in the immediate area. Due to the poor age class structure, large numbers of dead plants and high decadence, which has almost tripled, the trend for the key browse species is down. To further aggravate this situation, 26% of the population were classified as dying. The lack of seedlings in the area is a function of extended drought conditions as well as intense competition with the winter annuals when precipitation was adequate for establishment. The herbaceous understory does provide ground cover, but has the potential to carry a very destructive fire. The sum of nested frequency for perennial grasses declined, therefore the herbaceous understory trend is down. The Desirable Components Index rated this site as very poor with a score of 0 due to low perennial grass cover, high shrub decadence, very low recruitment of shrubs, and high annual grass cover.

#### TREND ASSESSMENT

soil - stable (0)

browse - down (-2)

herbaceous understory - down (-2)

winter range condition (DC Index) - Very Poor (0) Lower Potential scale

#### 2000 TREND ASSESSMENT

With continued drought, there has been a significant drop in protective ground cover from 51% to 35%. This decrease has been mitigated somewhat by the increase of cryptogamic cover from 2 to 12%. However, the percent bare soil has increased from 18% to almost 39%. Although there still does not appear to be any apparent erosion problems, the soil trend is slightly down due to the decrease in protective cover and high percentage of annual species. The abundant cover of annuals helps to protect the soil, but is detrimental to the community in other ways. Due to the poor age class structure, large numbers of dead plants and high decadence, which has continued to increase (12% in 1986, 32% in 1995, and 53% in 2000), trend for the key browse species continues to be down. The percentage of the population that are classified as dying continues to be high at almost 26% (also 26% in 1995). The lack of seedling establishment in the area was mentioned in 1995 and continues to be the case. This is a function of extended drought conditions as well as intense competition with the winter annuals, even when normal precipitation occurs. Annuals dominate the

herbaceous understory. The nested frequency of cheatgrass declined significantly, but was still very abundant and sampled in 97% of the quadrats. Nested frequency of perennials decreased slightly. Therefore, the herbaceous understory trend is slightly down. The Desirable Components Index rated this site as very poor with a score of 0 due to low perennial grass cover, high decadence, very low recruitment of shrubs, and high annual grass cover.

#### TREND ASSESSMENT

soil - slightly down (-1)

browse - down (-2)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - Very Poor (0) Lower Potential scale

#### 2005 TREND ASSESSMENT

The trend for soil is slightly down. This is due to a 17% decrease in the ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground (from 2.9:1 to 2.4:1) from 2000 to 2005. This ratio decrease is a product of a drastic decrease in cryptogamic crust nested frequency. As well, the nested frequency of annual grasses increased while that of perennial grasses decreased. The trend for browse is down. The key browse species basin big sagebrush decreased from 1,240 plants/acre in 2000 to 60 plants/acre in 2005, a 95% decrease. The percentage of decadent individuals increased from 53% in 2000 to 67% in 2005. This means that 40 of the 60 plants/acre found on the site are decadent and 40 of the 60 are dying. There are no young or seedlings on the site to repopulate the community with sagebrush. As well, all of the plants sampled showed heavy use. The herbaceous understory trend is down. This is due to a substantial increase in the nested frequency of annual grasses and forbs as well as substantial decrease in the nested frequency of perennial grasses. The total percent cover for annual grasses increased from 12 to 28 % from 2000 to 2005 and the total cover for annual forbs increased from 2 to 12%. Cheatgrass increased from 12 to 24% from 2000 to 2005. The nested frequency and total percent cover of perennial forbs also increased, but not enough to counter the effects of the annual grasses and forbs. The Desirable Components Index rated this site as very poor with a score of -15 due to low perennial grass cover, high decadence, very low recruitment of shrubs, and very high annual grass cover.

#### TREND ASSESSMENT

soil - slightly down (-1)

browse - down (-2)

herbaceous understory - down (-2)

winter range condition (DC Index) - Very Poor (-15) Lower Potential scale

#### HERBACEOUS TRENDS --

Management unit 13B, Study no: 1

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
G	<i>Bromus tectorum</i> (a)	-	<sub>b</sub> 384	<sub>a</sub> 334	<sub>a</sub> 345	12.39	12.20	23.82
G	<i>Hilaria jamesii</i>	<sub>c</sub> 206	<sub>b</sub> 114	<sub>ab</sub> 75	<sub>a</sub> 47	1.99	1.83	.93
G	<i>Oryzopsis hymenoides</i>	-	-	1	-	-	.15	-
G	<i>Sitanion hystrix</i>	9	-	-	-	-	-	-
G	<i>Sporobolus cryptandrus</i>	<sub>a</sub> 1	<sub>a</sub> -	<sub>b</sub> 23	<sub>b</sub> 25	-	.77	.47

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
G	<i>Vulpia octoflora</i> (a)	-	<sub>a</sub> 46	<sub>a</sub> 48	<sub>b</sub> 124	.09	.27	4.28
Total for Annual Grasses		0	430	382	469	12.48	12.47	28.11
Total for Perennial Grasses		216	114	99	72	1.99	2.75	1.40
Total for Grasses		216	544	481	541	14.47	15.23	29.52
F	<i>Astragalus</i> sp.	12	4	-	1	.01	-	.00
F	<i>Chenopodium fremontii</i> (a)	-	<sub>a</sub> -	<sub>b</sub> 39	<sub>a</sub> 9	-	.14	.02
F	<i>Chaenactis stevioides</i>	-	3	-	2	.00	-	.01
F	<i>Cryptantha</i> sp.	<sub>a</sub> -	<sub>b</sub> 12	<sub>a</sub> -	<sub>a</sub> -	.03	-	-
F	<i>Draba nemorosa</i> (a)	-	<sub>a</sub> 3	<sub>b</sub> 14	<sub>a</sub> 1	.00	.03	.00
F	<i>Erodium cicutarium</i> (a)	-	<sub>a</sub> 35	<sub>b</sub> 75	<sub>c</sub> 251	.45	1.25	10.16
F	<i>Gilia</i> sp. (a)	-	-	-	2	-	-	.00
F	<i>Lappula occidentalis</i> (a)	-	1	6	12	.00	.04	.03
F	<i>Lepidium densiflorum</i> (a)	-	<sub>b</sub> 120	<sub>a</sub> 25	<sub>b</sub> 108	.79	.18	.82
F	<i>Leucelene ericoides</i>	<sub>a</sub> 26	<sub>b</sub> 56	<sub>a</sub> 15	<sub>a</sub> 4	1.12	.13	.01
F	<i>Machaeranthera canescens</i>	-	-	1	7	-	.00	.07
F	<i>Navarretia intertexta</i> (a)	-	<sub>b</sub> 61	<sub>a</sub> 18	<sub>a</sub> 6	.13	.07	.01
F	<i>Oenothera albicaulis</i> (a)	-	9	-	3	.02	-	.00
F	<i>Plantago patagonica</i> (a)	-	<sub>c</sub> 191	<sub>a</sub> 10	<sub>b</sub> 149	.61	.06	.55
F	<i>Salsola iberica</i> (a)	-	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 68	-	-	.24
F	<i>Sisymbrium altissimum</i> (a)	-	<sub>b</sub> 156	<sub>a</sub> 24	<sub>a</sub> 22	.93	.24	.54
F	<i>Sphaeralcea parvifolia</i>	<sub>a</sub> -	<sub>a</sub> 7	<sub>a</sub> 5	<sub>b</sub> 24	.02	.01	.76
Total for Annual Forbs		0	576	211	631	2.95	2.05	12.41
Total for Perennial Forbs		38	82	21	38	1.20	0.14	0.86
Total for Forbs		38	658	232	669	4.16	2.20	13.28

Values with different subscript letters are significantly different at alpha = 0.10

#### BROWSE TRENDS --

Management unit 13B, Study no: 1

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	<i>Artemisia tridentata tridentata</i>	41	29	3	1.69	2.39	.18
B	<i>Gutierrezia sarothrae</i>	2	1	0	-	-	-
Total for Browse		43	30	3	1.69	2.39	0.17

# CANOPY COVER, LINE INTERCEPT --

Management unit 13B, Study no: 1

Species	Percent Cover
	'05
Artemisia tridentata tridentata	.01

# KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 13B, Study no: 1

Species	Average leader growth (in)
	'05
Artemisia tridentata tridentata	1.2
Grayia spinosa	3.2

# BASIC COVER --

Management unit 13B, Study no: 1

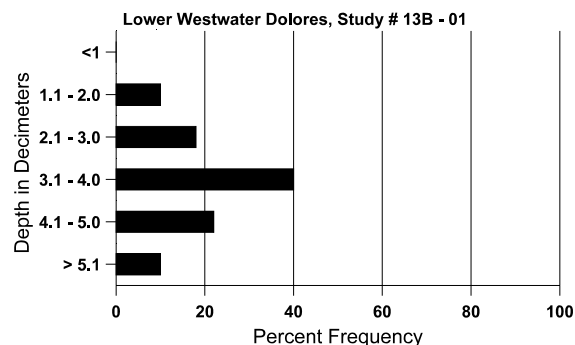
Cover Type	Average Cover %			
	'86	'95	'00	'05
Vegetation	11.50	29.78	22.89	42.96
Rock	0	0	0	0
Pavement	.25	0	0	0
Litter	50.50	51.34	34.70	31.29
Cryptogams	18.50	2.17	12.19	1.14
Bare Ground	19.25	17.96	38.54	31.76

# SOIL ANALYSIS DATA --

Herd Unit 13B, Study # 1, Study Name: Lower Westwater Dolores

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
19.0	63.8 (18.1)	8.2	71.0	16.4	12.6	0.0	3.9	118.4	0.1

## Stoniness Index



PELLET GROUP DATA --

Management unit 13B, Study no: 1

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	12	10	14
Elk	-	-	3
Deer	31	39	33
Cattle	3	4	11

Days use per acre (ha)	
'00	'05
-	-
12 (30)	1 (2)
79 (195)	29 (73)
27 (68)	26 (65)

BROWSE CHARACTERISTICS --

Management unit 13B, Study no: 1

		Age class distribution (plants per acre)					Utilization					
Y	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata tridentata</i>												
86	<b>5133</b>	-	-	4533	600	-	60	5	12	-	0	-/-
95	<b>1480</b>	-	20	980	480	1920	15	3	32	26	26	24/30
00	<b>1240</b>	-	20	560	660	1640	52	24	53	26	26	19/26
05	<b>60</b>	-	-	20	40	1320	0	100	67	67	67	15/27
<i>Atriplex canescens</i>												
86	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
95	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
00	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
05	<b>0</b>	-	-	-	-	-	0	0	-	-	0	23/13
<i>Grayia spinosa</i>												
86	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
95	<b>0</b>	-	-	-	-	-	0	0	-	-	0	17/26
00	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
05	<b>0</b>	-	-	-	-	-	0	0	-	-	0	24/44
<i>Gutierrezia sarothrae</i>												
86	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
95	<b>40</b>	-	20	20	-	-	0	0	-	-	0	12/12
00	<b>20</b>	-	-	20	-	-	0	0	-	-	0	5/-
05	<b>0</b>	-	-	-	-	-	0	0	-	-	0	12/14
<i>Opuntia sp.</i>												
86	<b>66</b>	-	-	66	-	-	0	0	-	-	0	6/7
95	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
00	<b>0</b>	-	-	-	-	-	0	0	-	-	0	7/-
05	<b>0</b>	-	-	-	-	-	0	0	-	-	0	7/33